UPPER PARIS BRIDGE
(Wapsipinicon River Bridge)
Iowa Bridges Recording Project
Spanning over the Wapsipinicon River on Sutton Road
3.8 miles S.W. of Coggon,
approximately .3 miles N.W. of Paris
Paris Vicinity
Linn County
Iowa

HAER No. IA-83

BLACK & WHITE PHOTOGRAPHS

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WRITTEN HISTORICAL & DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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UPPER PARIS BRIDGE
(Wapsipinicon River Bridge)

HAER No. IA-83

Location:	Spanning the Wapsipinicon River on Sutton Road, 3.8 miles southwest of Coggon; Linn County, Iowa. UTM: 15.616800.4677660 USGS: Section 19, Township 86 North, Range 6 West
Date of Construction:	1879
Designers:	Wrought Iron Bridge Company, Canton, Ohio
Builders:	Wrought Iron Bridge Company, Canton, Ohio; Clayston and Wood
Fabricators:	Wrought Iron Bridge Company, Canton, Ohio
Present Owner:	Linn County
Present Use:	Roadway bridge
Significance:	This Whipple through truss is structurally significant wagon crossing and a rare example of a double-intersection Pratt truss with the rare use of wrought iron components along with its truss configuration (diagonals extending over two panels). It is one of only eight pin-connected Whipple through trusses remaining in Iowa and is the longest of the eight.
Historians:	Richard Vidutis, Jim Hippen
Project information:	This document was prepared as part of the Iowa Historic Bridges Recording Project performed during the summer of 1996 by the Historic American Engineering Record (HAER). The project was sponsored by the Iowa Department of Transportation (IDOT). Preliminary research on this bridge was performed by Clayton B. Fraser of Fraserdesign, Loveland, Colorado.

EVENTS SCHEDULE

June 1868 - Linn County Board of Supervisors appoints a bridge committee to pick the best place in Paris (Robinson Ford crossing or at Troy) for a bridge across the Wapsipinicon River.

September 1868 - the area known as Troy is presented to the board as the best spot to bridge the Wapsie River.

June 1869 - board appropriates $4,000 for the building of a bridge at Troy.

October 1870 - built north and west of Paris, the first Paris Bridge is a wooden structure with no foundation on the north end.

1878 - wooden Paris Bridge is considered worn and rotten.

June 1879 - board lets a contract to Clogston and Wood for the erection of the Paris Bridge substructure, a foundation of stone piers and wood pile on north approach for $1,564.72.

July 1879 - board lets a contract to Canton Wrought Iron Bridge Co. of Canton, Ohio to build the Paris Bridge superstructure, a 160′ long iron Pratt truss for $3,400.

INTRODUCTION

The Upper Paris Bridge spans the Wapsipinicon River in northern Linn County. It is a well-preserved Whipple truss erected by the Canton Wrought Iron Bridge Co. of Canton, Ohio[1] on a timber and stone substructure built by Clayston and Wood. The entire bridge was built in 1879 and today remains as a rare example of a double-intersection (across two panels) Pratt truss (also known as a "Whipple" truss) which was seldom used for wagon trusses in the state of Iowa. Few were ever erected in Iowa and the Upper Paris Bridge is one of eight remaining in the state. Besides its rare truss configuration, the Upper Paris Bridge sports other rare features such as the use of wrought iron components, and of the remaining Whipple trusses in Iowa, it is the longest one at 160'.

A few years ago Linn County undertook a massive effort to repair and preserve its old trusses. They were sandblasted, primed with silver-colored paint, and then painted in bright hues. The Upper Paris stands today in very good shape and is marked by its new coat of bright red paint.[2]

I. REGIONAL HISTORY

The vast area of Iowa was included in the Louisiana Purchase, approved by Congress in 1803. In 1807, Iowa was included in the Territory of Illinois; in 1812, in the Territory of Missouri; in 1834, with the Black Hawk Purchase, all of the territory west of the Mississippi and north of the northern boundary of Missouri was made a part of the Territory of Michigan. In September, 1834, the Legislature of Michigan established two precincts, or counties, in Iowa. These counties were Dubuque and Des Moines. In 1836 the Territory of Wisconsin was organized and Iowa became part of that political division. Meeting in October of 1836, the Legislature of the Territory of Wisconsin divided Des Moines County into Lee, Des Moines, Henry, Louisa, Muscatine, and Van Buren Counties,[3] and on October 21, 1837, Dubuque county was sub-

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[1]The Wrought Iron Bridge Company of Canton, Ohio was a prominent bridge builder in Iowa. By 1885 the company had installed up to 21,600 feet of iron bridges in the state. *News-Letter*, 1996 (photo article by Chris Umscheid).

[2]Ibid.

[3]The History of Van Buren County, Iowa (Chicago: Western Historical Co., 1878), pp. 361-362.

divided into Dubuque, Clayton, Jackson, Benton, Jones, Clinton, Johnson, Scott, Delaware, Buchanan, Cedar, Fayette, Keokuk, and Linn Counties.[4]

The village of Paris lies in Jackson Township, in a bend of the Wapsipinicon River in the middle of good farming country. The first settler, Samuel W. Justin, came to the area in 1845 and built the first house and by 1855 the village was laid out in Sections 19, 20, and 30. Documentation does not exist to explain why the exact area of Paris was chosen for settlement--perhaps good bottom land along the Wapsie River, or the swiftness of the river lured would-be millers--but that Paris was expected to be great is alluded to in a handbook of Iowa published in 1857 by J.G. Mills, of New York, who added the village to a list of newly founded towns as "the new town of much promise by the high-toned name of Paris, located in Jackson Township, near the town of Coggon."[5] Although the village never developed into a large town, by 1878 it contained about twenty houses; "but being surrounded by a good circle of farms, it will maintain its present capacity as a trading point and probably grow with time."[6] Very little of Linn County lies in the Valley of the Wapsipinicon River because the basin of the valley is rather narrow averaging about fifteen miles in width along its 255 miles. But at Central City, about five miles to the southeast of Paris, and on Buffalo Creek in the vicinity of Coggon, about five miles to the northeast, excellent mill sites were constructed by early settlers.[7] And Paris itself had its share of mills during the heyday of milling in the 1850s and 1860s. The first mill to go up in Jackson Township was the Mills & Johnson in 1855. It was sold and removed to Cedar Rapids and another one was built by Josiah Plank in 1855. It lasted five years before being washed away by a flood. In 1858 a stone grist-mill was erected by William Bruce on the Buffalo Creek.[8]

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[4]Luther A. Brewer and Barthinius L. Wick, History of Linn Co., Iowa, Vol. I (Chicago: The Pioneer Publishing Co., 1911), p. 32.

[5]Ibid., p. 144.

[6]The History of Linn County, Iowa (Chicago: Western Historical Co., 1878), p. 597.

[7]William J. Petersen, Iowa: The Rivers of Her Valleys (Iowa City: The State Historical Society of Iowa, 1941), pp. 108, 113-14.

[8]Ibid.

II. HISTORY OF THE UPPER PARIS BRIDGE

There were two crossings erected northwest of Paris, one in 1870, and the second one in 1879. The first crossing at Paris was discussed in June of 1868 by the Linn County Board of Supervisors when they appointed a special bridge committee to examine several places (on the Robinson Ford crossing, and at Troy) in Paris along the Wapsipinicon River to determine "at which point with Bridge would best subserve the interest of the people of that part of the city."[9] The bridge committee presented their findings in September 1868 and were of the opinion that Troy was the best spot at which to bridge the river. The board filed the report and disbanded the special committee.[10] Nine months later it met and appropriated $4,000 for the building of a bridge at Troy, the spot recommended by the bridge committee. But in spite of the money being made available, the bridge commissioner was instructed to expend no money in bridging the Wapsipinicon until interested parties "give satisfactory assurance that they will make up any necessary deficiency to build a good bridge with stone abutments and piers so that the Bridge will be properly protected and made available to citizens of that locality and the public generally."[11]

Apparently satisfactory assurance was given. By October 1870 (the year the Board of Supervisors oversaw the construction of 57 bridges in Linn County[12]) the board discussed the Paris Bridge: a resolution was accepted to pay a J.M. Starbuck $50, an amount yet unpaid on his contract, for the ripraping of the piers for the Paris Bridge,[13] in January of 1872 the board had before it a petition for repairs to the Paris Bridge,[14] and in May of that year the board spent $100 to anchor the Paris Bridge on the

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[9]"Linn County Bridges" (information on bridges copied from the Proceedings of the Linn County Board of Supervisors, 1843 to 1900; WPA, 1940), p. 424 (June 1868). Located at the Linn County Engineer's Office, Cedar Rapids, Iowa.

[10]Ibid., p. 438 (September 1868).

[11]Ibid., p. 489 (June 1869).

[12]Ibid., p. 236 (January 1876).

[13]Ibid., p. 595 (October 1870).

[14]Ibid., p. 50 (January 1872).

Wapsie.[15] This first Paris bridge was a wooden structure erected over the river north and west of the town. There was no foundation directly north on the section line. By 1878 it was considered worn and rotten enough that "A new one will probably soon replace it."[16]

Seven years passed before the Paris Bridge is mentioned again in the board minutes. This time, in June of 1879, the board let a contract to Clogston and Wood for the erection of stone piers,[17] and by July, the Canton Wrought Iron Bridge Co. is mentioned as having "made the most favorable proposition" on a contract to build two iron bridges in Linn County in 1879 for the sum of $5,000.[18] One of the bridges built by Canton Wrought Iron Bridge Co. was the Paris Bridge[19]--an iron Pratt truss, 160' long (for $3,400) with a foundation and approach of stone piers and [wood] pile[20] (for $1,564.72), and the other one--an iron arch, 80' long (for $2,065) was across Indian Creek in Marion Township.[21]

Unmentioned in the only history we have of the Paris Bridge, in the Minutes of the Linn County Board of Supervisors, is what style of bridge the earlier crossing was, whether the current Paris Bridge was placed at the same location as the earlier one, when the new bridge was completed, and why it is currently referred to as the Upper Paris Bridge. Nowhere in the records is the qualifier "Upper" encountered. One can conjecture that

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[15]Ibid., p. 75 (May 1872).

[16]Ibid., The History of Linn County, Iowa, 1878, p. 597.

[17]Ibid., p. 423 (June 1879).

[18]Ibid., p. 424 (July 1879).

[19]The Upper Paris Bridge is designated Bridge No. 762 by the Linn County Engineering Office, Cedar Rapids, Iowa.

[20]A 1" to 200' scale topographic map drawn October 31, 1959, by L.R. Boettcher lists the dimensions of Bridge No. 762 (Paris) as 208' x 16' wide, 1-160' hi. truss, plus 2-24' wood pile on north approach. Located at the Linn County Engineer's Office, Cedar Rapids, Iowa.

[21]Ibid., p. 449 (January 1880).

"Upper" may refer to the placement of the bridge 1,516.5'[22] by road northwest--"up"--from Paris.

III. DESIGN AND TECHNOLOGY OF THE UPPER PARIS BRIDGE

The Upper Paris Bridge is a double-intersection Pratt truss, also known as a Whipple truss. The purpose of the double intersection feature, that is the diagonals passing over two panels, was to allow for smaller panels (in both height and width), thus requiring lighter sections for the posts. The usual shallowness of a Whipple truss is present in this example where for a span of 158' the height is only 22'-1 1/4". The Upper Paris bridge, built in 1879, is constructed of wrought iron, cast iron, and timber.

The double-intersection design had been well known to bridge builders for a generation, as it had been introduced by Squire Whipple in 1847.[23] Used in Iowa both for large, multiple span river crossings and, less frequently, for smaller spans as at Upper Paris, the Whipple truss was a standard design, although less used than bowstrings, Pratt trusses, or wooden Howe trusses. Upper Paris is a particularly well preserved example of what Eric Delony notes as the "American Standard" bridge of the last third of the nineteenth century.[24] By the 1870s engineers were furnished with the techniques to design, and in most cases did design trusses that used materials properly proportioned to their strength and the load they would carry. There were, however, two legacies present from earlier decades. One was the tendency to retain many specialty pieces, such as fittings for panel joints, which required extra work in fabrication and introduced uncertainties in calculating strains.[25] The other tendency of doubtful value was the fondness for patented features. These did, some cases, represent real improvements, but they often provided an excuse to proclaim a bridge as "patented," when only a very

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[22]Ibid., topo. map., Boettcher, 1959.

[23]Carl W. Condit, American Building Art: The Twentieth Century (New York: Oxford University Press, 1961), pp. 113-117.

[24]Landmark American Bridges (New York: American Society of Civil Engineers, 1993), pp. 68-89.

[25]An example at Upper Paris is the fittings at joints L_1 and L_{10} where the hip vertical does not have a pin connection with the lower chord.

modest feature of the design was actually entitled to patent protection.

The Wrought Iron Bridge Company of Canton, Ohio, designed and built the Upper Paris Bridge. They were one of the largest builders of wagon bridges in the United States, and provided hundreds of structures to the counties of Iowa.[26] They also plastered their structures with patent notices. The portals have cast-iron builder's plates which announce "PATENTED NOV. 21st, 1876." Each of the four hip joint hoods had the cast letters "PATENTED 1876." It is natural to ask just what about this bridge was patented.

U.S. Patent No. 184,520 was issued November 21, 1876, to David Hammond, Henry G. Morse, and Job Abbott of Canton, Ohio.[27] They were, respectively, the president and chief engineer of the Wrought Iron Bridge Company. Of the six claims made in the patent, Upper Paris uses three. Two (numbers 1 and 2) mention diagonal ties which hold the truss posts longitudinally in the center. Upper Paris has a longitudinal rod, parallel to the chords, passing through the centers of the web posts. This feature is not specifically covered by this patent.[28] But at the first web post, that is at the second panel point from the end (U_2L_2 and U_9L_9), there is a diagonal rod from the center of that post, attached by "jam nuts and oblique washers," to carry the force transmitted by the horizontal rods to the hip joint. This is a patented feature.

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[26]The company's bridges still survive in many Iowa locations, although the number is diminished every year. See Fraserdesign, Iowa Historic Bridge Inventory (1993) and Book of Designs of Wrought Iron Bridges built by the Wrought Iron Bridge Co. of Canton, Ohio (Canton: 1874).

[27]Official Gazette of the United States Patent Office 10 (Tuesday, November 21, 1876), pp. 831-832, 840-841; Specification forming part of Letters Patent No. 184,520, Improvement in Truss-Bridges.

[28]There is another patent of November 21, 1876, No. 184,490, issued to Job Abbott for an Improvement in Metallic Arch-Bridges which mentions a horizontal rod attached to arch posts to add longitudinal stability. Whether this would apply to a truss bridge like Upper Paris is unknown.

The other claim that applies to the Upper Paris bridge is for the construction of the hip joints. This was to be accomplished

> by planing the end post to fit under the end of the upper chord, and uniting the two posts by inside plates and corner-pin, with additional beveled bearing-plates for battered end trusses, thus forming an economical all wrought-iron corner-connection.[29]

This is just how the hip joints are constructed on the Upper Paris bridge. They were covered with hoods with the casting "PATENTED 1876."

When one turns to the comparable bridge in the Wrought Iron Bridge Company catalogue for 1874--five years before Upper Paris Bridge was built--the description is surprising. For the "Wrought Plate and Channel Truss Bridge" as described there seems in many ways a superior structure.[30] Instead of the end post being planed to fit under the upper chord, as in the patent, the chord and the end post are planed for a mitre joint, a better practice that became standard in bridge work. What the patent did was to save the cost of half the planing. Also, in the catalogue description, the vertical web posts are made of two channels and two plates, a much heavier construction than the single I-beam used in Upper Paris. The longitudinal and diagonal bars (as in the patent) allowed a much lighter section to be used for the posts. The catalogue mentions other items which were of superior quality: an example is "drilled eye bars" for the lower chords and diagonals. Upper Paris uses loop bars instead, where the eyes are formed by welding, an inferior practice. The unavoidable conclusion is that the Upper Paris bridge, as built, is as light weight, and therefore as cheap, as could be achieved. Its patented features were for that purpose, and they must have impressed county supervisors more than experienced bridge engineers. Of course competition was tough in the iron bridge business, so a successful company had to figure costs closely. This problem was solved by the bridge companies fixing prices and allocating the contracts (and a share of the profit) among themselves.[31] There

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[29]Patent Specification No. 185,520.

[30]Book of Designs, sheet 10 (2 pages) and accompanying text.

[31]Leslie Pitner, Historic American Engineering Record, Southwest Fifth Street Bridge, Des Moines, Iowa, Report, 1995, HAER No. IA-71.

is no evidence if this was or was not the case at Upper Paris.

So the bridge stands today, successfully carrying traffic since 1879, a monument to the ingenuity of nineteenth-century entrepreneurs and engineers. It is a museum of practices--some good and some questionable--in American bridge building.[32]

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[32]A fuller analysis and comparison of similar bridges by the same company could further test these conclusions.

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APPENDIX A List of Illustrations

Fig.1 Profile sketch of the Upper Paris Bridge. Jim Hippen, 1996.

Fig.2 Map of Paris, 1913. Iowa State Highway Commission Minutes, Ames.

Fig.3 USGS topo. map. Central City Quad., 1968. 7.5 min. series.

UPPER PARIS BRIDGE

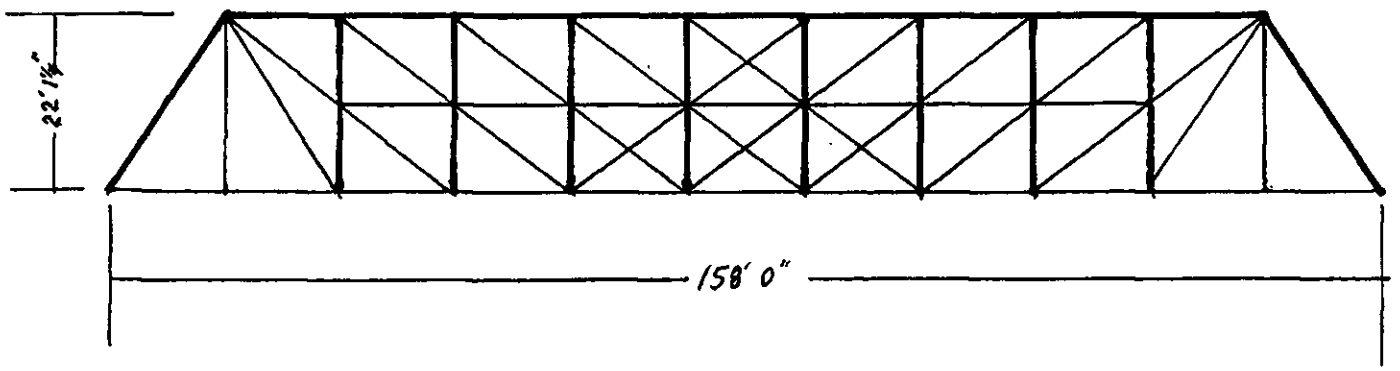

Fig.1 Profile sketch of the Upper Paris Bridge. Jim Hippen, 1996.

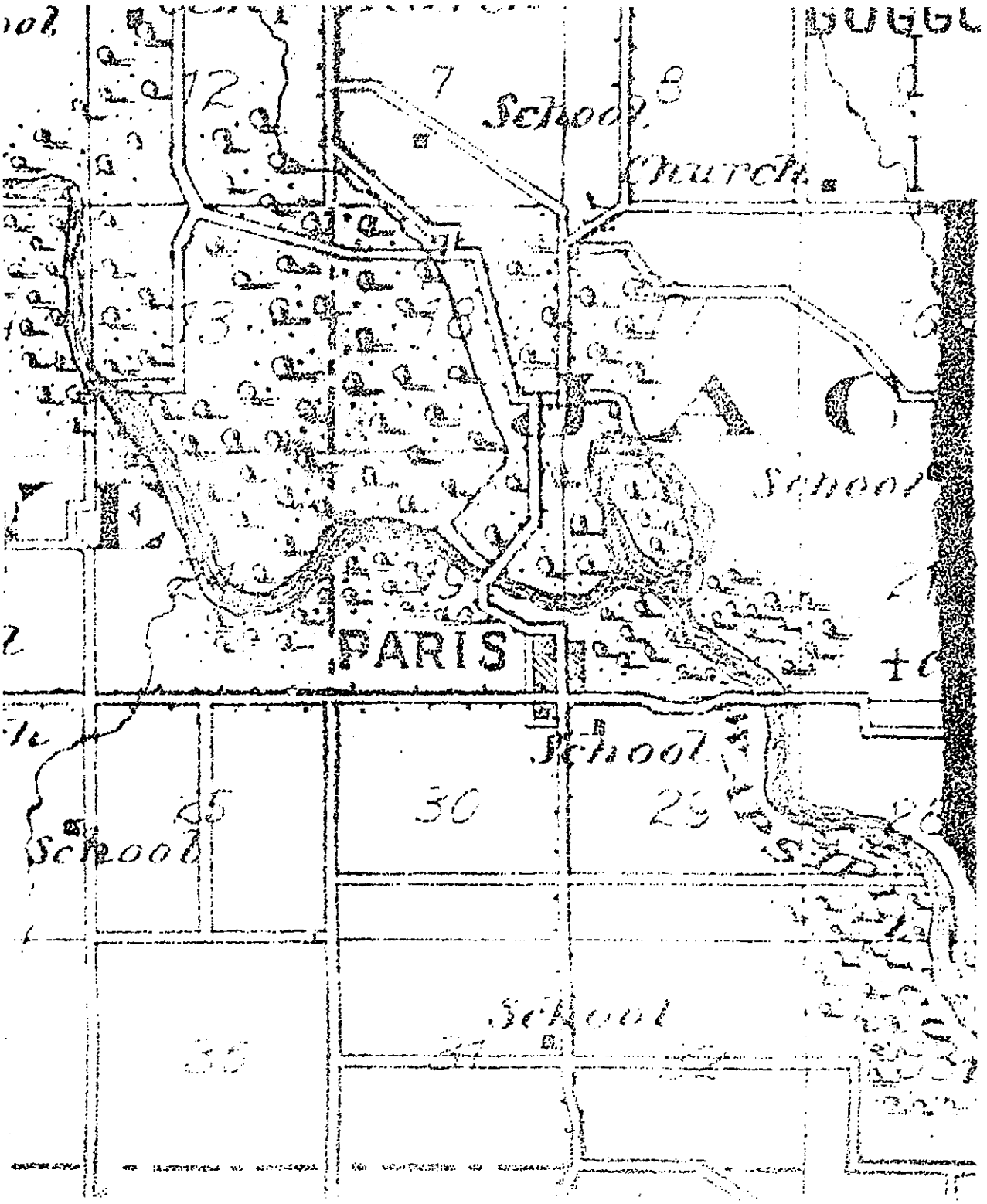

Fig.2 Map of Paris, 1913. Iowa State Highway Commission Minutes, Ames.

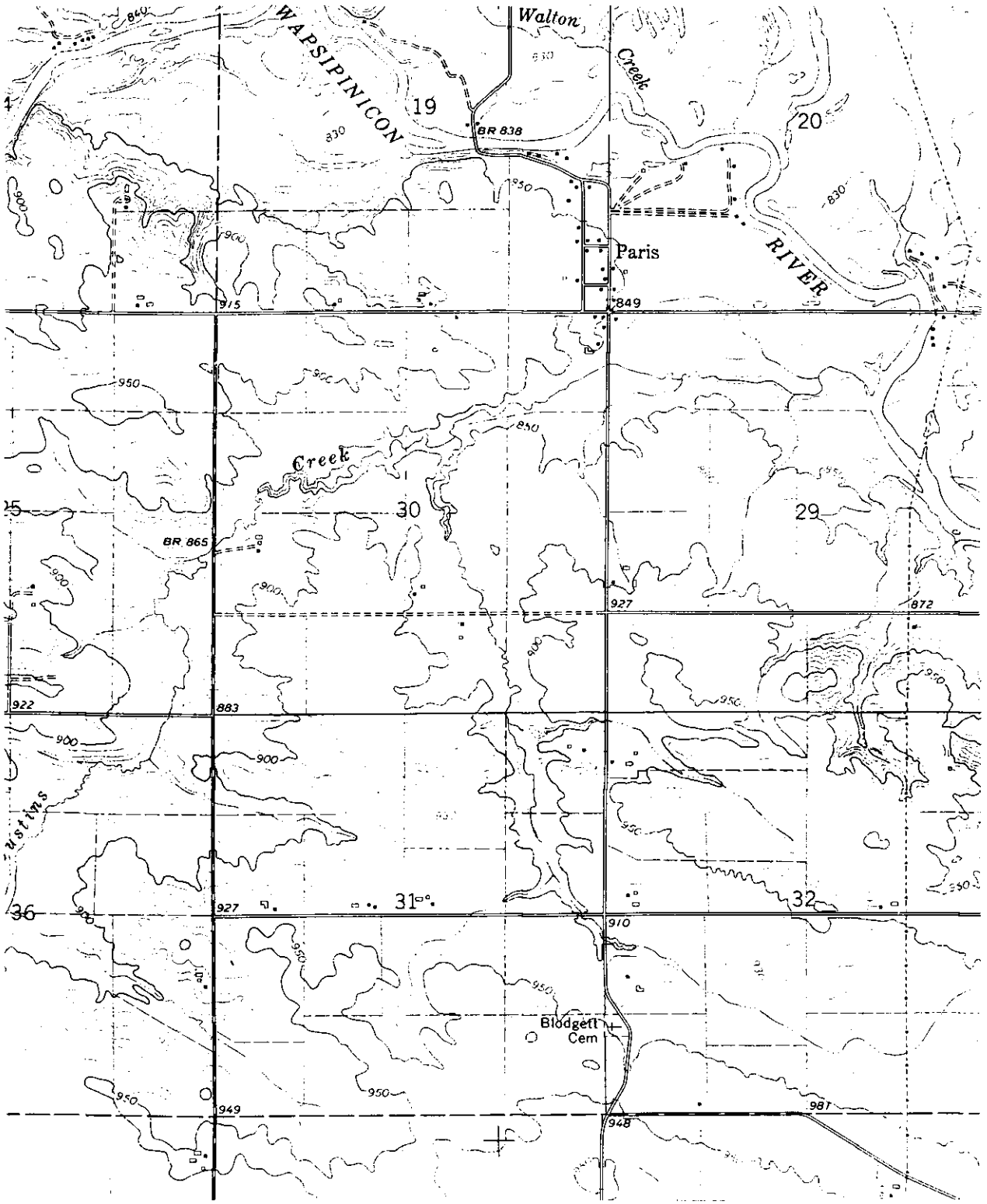

Fig.3 USGS topo. map. Central City Quad., 1968. 7.5 min. series.

APPENDIX B Research Statement

Research Limitations

No bridge designs or historic photographs were discovered during the time of research on the Upper Paris Bridge.

ADDENDUM TO
UPPER PARIS BRIDGE
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This appendix is an addendum to a 17-page report previously transmitted to the Library of Congress.

APPENDIX: ADDITIONAL REFERENCES

Interested readers may consult the Historical Overview of Iowa Bridges, HAER No. IA-88: "This historical overview of bridges in Iowa was prepared as part of Iowa Historic Bridges Recording Project - I and II, conducted during the summers of 1995 and 1996 by the Historic American Engineering Record (HAER). The purpose of the overview was to provide a unified historical context for the bridges involved in the recording projects."